

Patent  
P56315**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

GRIFFITH S. EVANS

LO  
4-25-02  
HS

Serial No.: to be assigned

Examiner: to be assigned

Filed: 15 January 2002

Art Unit: to be assigned

For: ***PISTON-ACTIVATED VALVE AND METHODS AND APPARATUS FOR  
RESTRAINING FREE PLAY IN A DEVICE*****INFORMATION DISCLOSURE STATEMENT**Assistant Commissioner  
for Patents  
Washington, D.C. 20231

Sir:

In accordance with 37 C.F.R. §§ 1.56, and 1.97 and 1.98 applicant cites, provides copies and briefly discusses the following references cited by U.S. Patent Office:

**U.S. PATENT REFERENCES:**

<b><u>Publication No.</u></b>	<b><u>Inventor</u></b>	<b><u>Publication Date</u></b>
• US 5,579,636	Rosenfield	Dec. 3, 1996
• US 6,145,864	Sutherland	Nov. 14, 2000
• US 5,529,333	Rizzi, et al.	Jun. 25, 1996
• US 5,070,575	Redman, et al.	Dec. 10, 1991
• US 4,813,163	Livingston, et al.	Mar. 21, 1989
• US 4,619,284	Delarue, et al.	Oct. 28, 1986

- US 4,570,658 Dean et al. Feb. 18, 1986
- US 3,940,185 Katzer Feb. 24, 1976
- US 4,205,896 Borsuk Jun. 3, 1980

**OTHER DOCUMENT:**

- Scot Drawing 5647100 "Exhibit A" (Fall 1999)

Patent No. US 5,579,636 to Rosenfield et al., entitled *Pyrotechnic Valve, Igniter And Combustion Preheater For Hybrid Rocket Motors*.

Patent No. US 6,145,864 to Sutherland, entitled *Safety Apparatus For Pivotably Coupled Vehicles*.

Patent No. US 5,529,333 to Rizzi, et al., entitled *Apparatus For Use In Inflating An Air Bag And Method Of Making The Apparatus*.

Patent No. US 5,070,575 to Redman, et al., entitled *Vertically Adjustable Sliding Door Suspension System*.

Patent No. US 4,813,163 to Livingston, et al., entitled *Alignment Fitting For Attaching Implements To A Backhoe*.

Patent No. US 4,619,284 to Delarue, et al., entitled *Pyrotechnic Valve*.

Patent No. US 4,570,658 to Dean et al., entitled *Pyrotechnic-Actuated Dual Air Valve*.

Patent No. US 3,940,185 to Katzer, entitled *Centering Device For Rail Brake Magnets On Vehicles*.

Patent No. US 4,205,896 to Borsuk, entitled *Method And Apparatus For Fixing The Rotational Positions Of Eccentric Elements In An Optical Fiber Connector*.

Also, the Examiner is respectfully advised that in the Fall of 1999 a proposal was submitted to a prospective contractor disclosing a pyrovalve including Scot Drawing 5647100 attached hereto as "Exhibit A", that utilizes redundant initiators and one piston. However, it is understood that at the time of submission of the proposal the pyrovalve illustrated in Scot Drawing No. 5647100 ("Exhibit A") had not been physically reduced to practice.

The following disclosure was included in relation to the above mentioned Fall 1999 proposal:

Application of current in excess of 3.5 amps to the bridgewire of either initiators will drive the piston downward, shearing the seal tube and allowing gas flow. The skirt lock on the piston will expand into the groove provided in the housing when the piston is accelerated and bottoms in the housing, thus assuring that the piston remains bottomed and the valve remains open. Omniseals are

used on moving parts and metal boss seals are used in the static sealing positions in order to affect sealing over the temperature range -170°F to +120°F.

The pyrovalve, normally closed, in Scot P/N 5647100 ("Exhibit A"), provides fluid control for helium purge. In the non-actuated state, the valve provides a normally closed flowpath with the seal tube presenting a barrier between inlet and outlet. In the actuated condition, the valve opens the flowpath and permits the flow of gas.

The valve is made up of four primary components; a valve housing, two threaded cartridge assemblies, one piston assembly and a seal tube. The cartridge unit, Scot P/N 5641800, is the same cartridge unit used on the EELV pneumatic actuator subsystem.

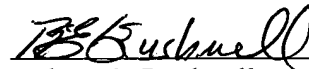
The valve has a single flowpath from inlet to outlet. Installed in line to the flowpath is a seal tube. Perpendicular to the seal tube, a piston assembly is aligned to shear the seal tube when actuated. Two cartridge assemblies are available and capable of driving the piston and shearing the seal tube, opening the flowpath, and allowing gas flow. A shear pin is installed between the seal tube and piston to hold the piston in the normally closed (N/C) position. Upon actuation and after the piston has severed the nipple of the seal tube and has bottomed, a skirt at the base of the piston flares into the space provided by the lock plug and locks the piston in place thus assuring unrestricted flow through the valve.

Upon activation of either or both of the cartridge assemblies, the valve begins a three step operation. In the initial step, the cartridge is ignited and gas pressure starts to build in the volume between the cartridge and the piston. The second step occurs when the gas pressure builds and the resultant force on the piston is large enough to shear the installed shear pin and drive the piston to

contact the seal tube. In the third step, the piston shears the seal tube and bottoms the skirt of the piston into a recess in the body. The deformed leading edge of the skirt provides a piston locking operation which eliminates rebound.

This citation of foregoing references is not intended to constitute an assertion that other or more relevant art does not exist. Accordingly, the Examiner is requested to make a wide-ranging and through search of the relevant art.

Respectfully submitted,



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Date: 15 January 2002  
I.D.: REB/mn

**INFORMATION DISCLOSURE STATEMENT**

PTO-1449

 SERIAL NUMBER *to be assigned*

DOCKET NO. P56315

APPLICANT

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FILING DATE

15 January 2002

GROUP

*to be assigned*

 10/04/02  
 10/04/02  
 10/04/02

01/15/02

**U.S. PATENT DOCUMENTS**

EXAMINE	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE
	US 5,579,636	12/03/96	Rosenfield			
	US 6,145,864	11/14/00	Sutherland			
	US 5,529,333	06/25/96	Rizzi et al.			
	US 5,070,575	12/10/91	Redman et al.			
	US 4,813,163	05/21/89	Livingston et al.			
	US 4,619,284	10/28/86	Delarue et al.			
	US 4,570,658	02/18/86	Dean et al.			
	US 3,940,185	02/24/76	Katzer			
	US 4,205,896	06/03/80	Borsuk			

**FOREIGN PATENT DOCUMENTS**

TRANSLATION

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	YES	NO

**OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)**

	Scot Drawing 5647100 "Exhibit A" (Fall 1999)

EXAMINER:

DATE CONSIDERED:

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.